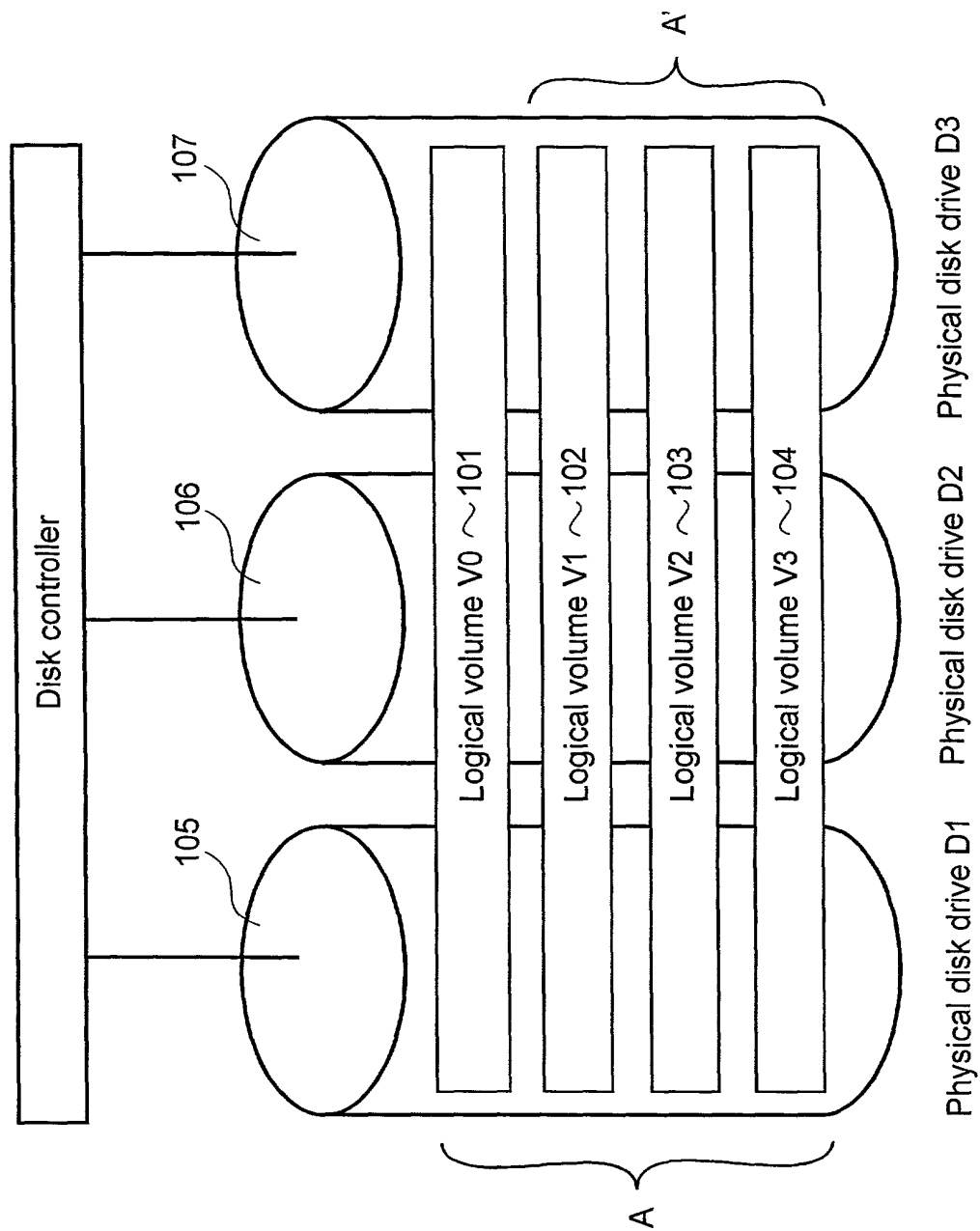Robert C. Colwell, Reg. No. 27,431   (650) 326-2400
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Title: System and Method for Storing Data
Atty Docket No. 16869P-030800
Sheet 1 of 11

FIG.1

Disk controller

105

106

107

A'

Logical volume V0 ～101

Logical volume V1 ～102

Logical volume V2 ～103

Logical volume V3 ～104

A

Physical disk drive D1   Physical disk drive D2   Physical disk drive D3

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Title: System and Method for Storing Data
Atty Docket No. 16869P-030800
Sheet 2 of 11

FIG.2

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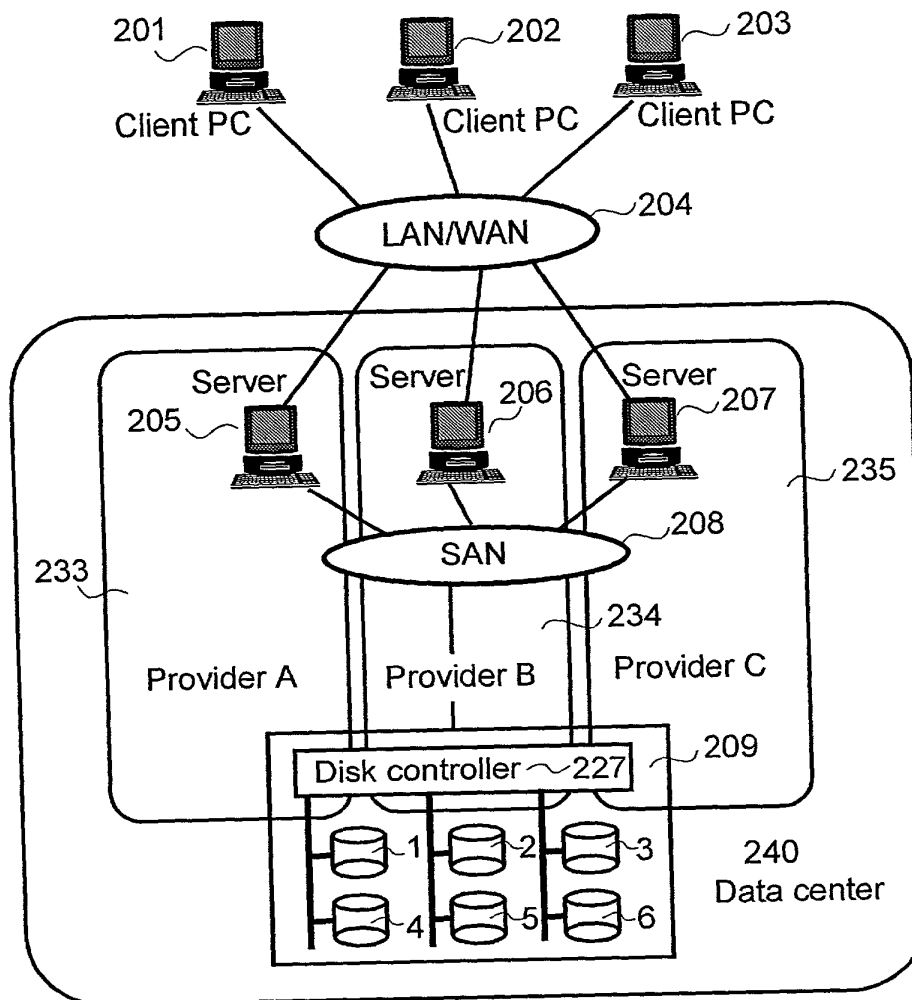**Sheet 3 of 11**

FIG.3

Detailed drawing of storage system
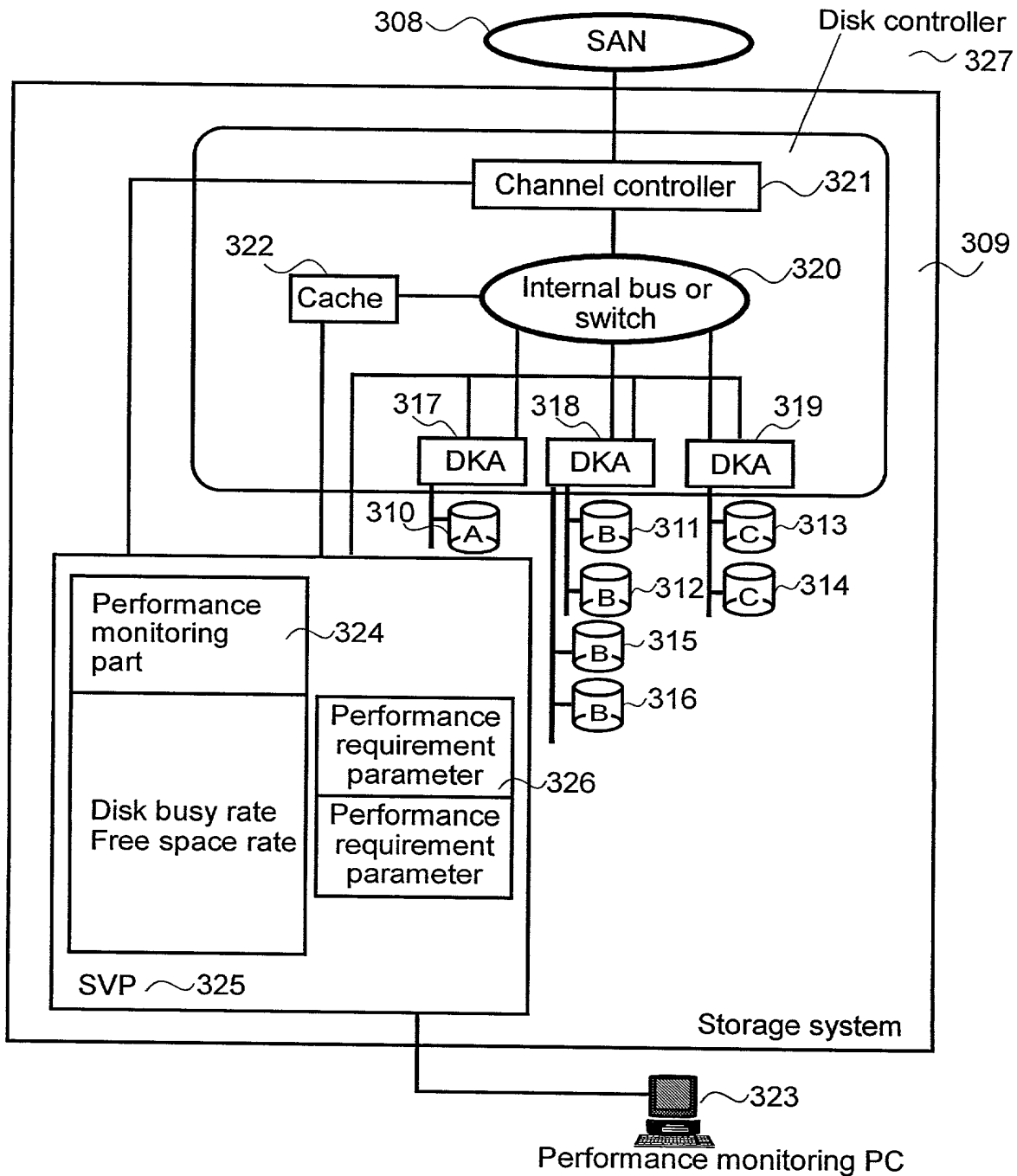
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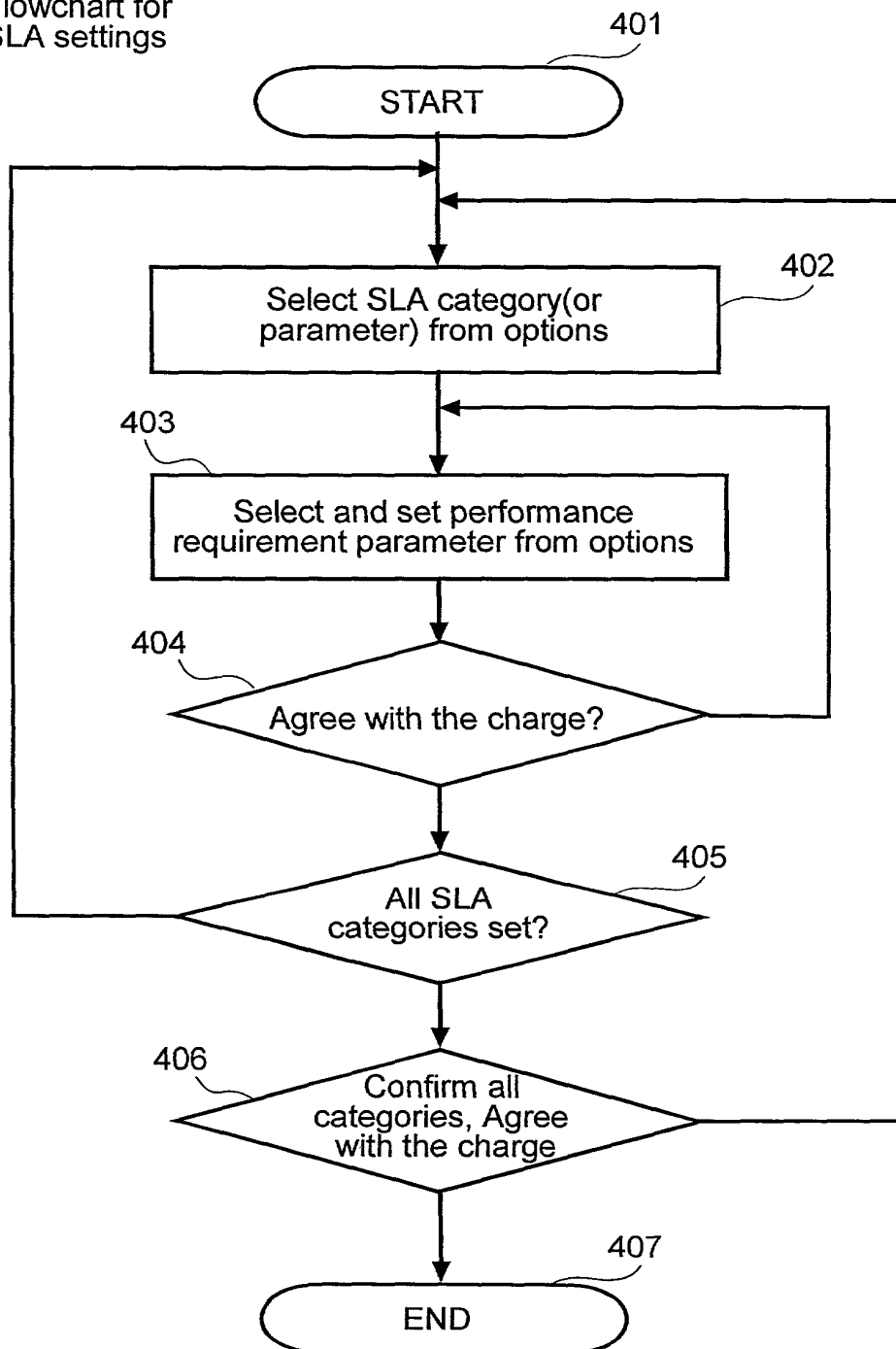**Atty Docket No.** 16869P-030800
Sheet 4 of 11

FIG.4

Flowchart for
SLA settings

START — 401

Select SLA category(or parameter) from options — 402

Select and set performance requirement parameter from options — 403

404 — Agree with the charge?

All SLA categories set? — 405

406 — Confirm all categories, Agree with the charge

END — 407

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Title: System and Method for Storing Data
Atty Docket No. 16869P-030800
Sheet 5 of 11

FIG.5

Category selection
screen

501 ☐   I/O accessibility

502 ☐   Data transfer volume

503 ☐   Disk busy rate

504 ☐   Data transmission speed

.

.

.

FIG.6

Performance requirement
parameter setting screen

Disk busy rates

Type A: _Average XX%   AA yen/month ∼ 601
Type B: _Average YY%   AA yen/month ∼ 602
Type C: _Average ZZ%   AA yen/month ∼ 603

Type A: Suited for storing data accessed by end user
Type B: Suited for storing client data
Type C: Suited for storing application files

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Applicant: Hiroshi Koizumi, *et al.*
Title: System and Method for Storing Data
Atty Docket No. 16869P-030800
Sheet 6 of 11

FIG.7

Logical volume number	Average drive busy rate	Maximum drive busy rate	Average drive busy (after migration)	Maximum drive busy (after migration)
V0	10.7%	15%	40%	50%
V1	28.3%	35%	22.3%	25%
V2	16.7%	15%	39%	45%
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.

701   702   703   704   705

RAID group : 1
RAID group average drive busy rate
　　　　　　　(required rate) : Average 60% or less

706

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Atty Docket No. 16869P-030800
Sheet 7 of 11

FIG.8

Start application operations ⌇801

Set performance requirement parameter ⌇802

803
Does parameter exceed required max value?

NO →

804
Is parameter less than required min value?

NO

YES

YES

805
Is there a destination storage medium?

NO

YES

806
Display message

807
Execute data migration

808
Continue operations

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Title: System and Method for Storing Data
Atty Docket No. 16869P-030800
Sheet 8 of 11

FIG.9

Flowchart for outputting
reports

901

START

902

Collect actual storage
performance variables

903

Actual storage
performance variables
satisfy SLA?

YES   NO

904   905

Output periodic
report

Output penalty report,
discount the charge

906

Send report
to user

907

END

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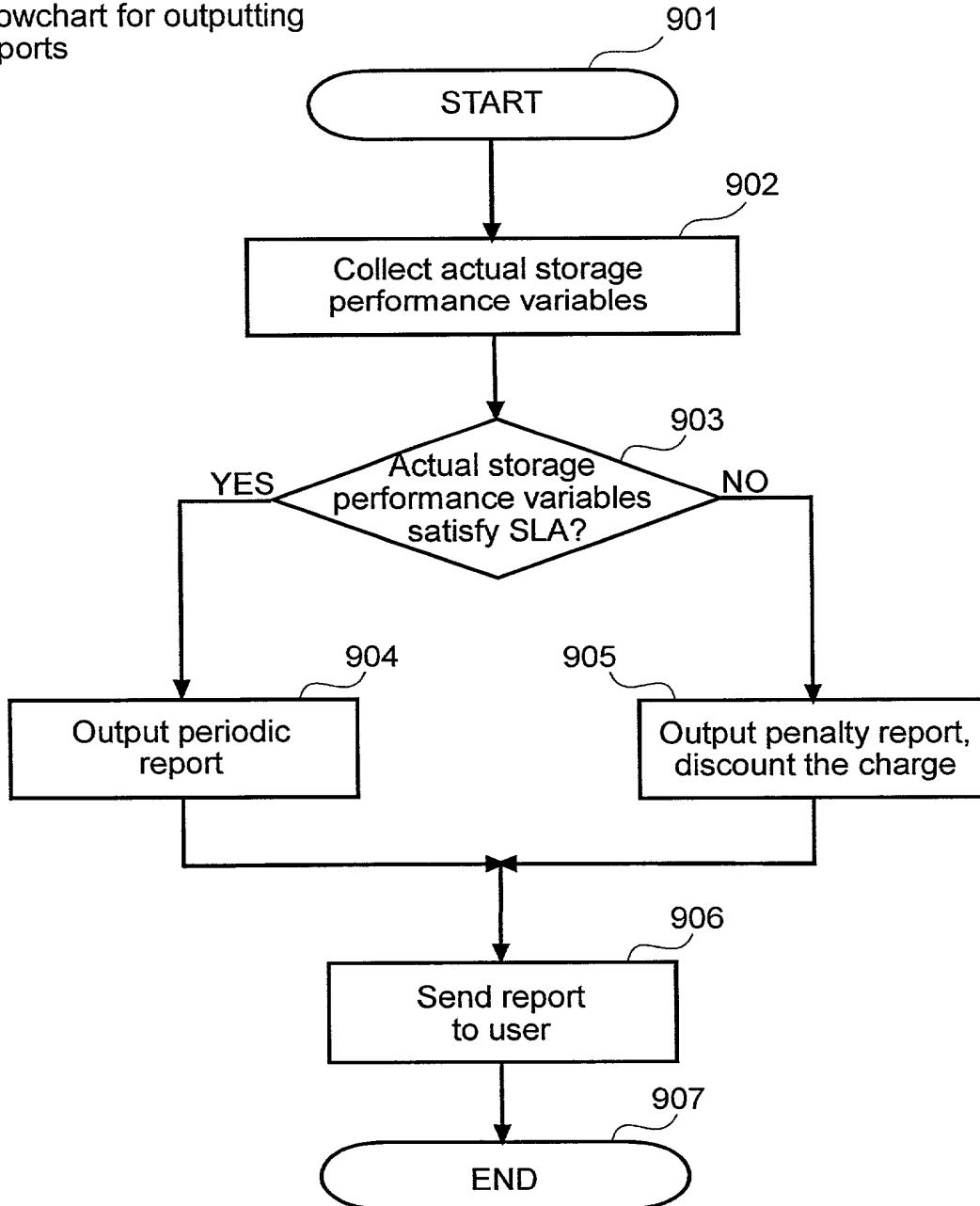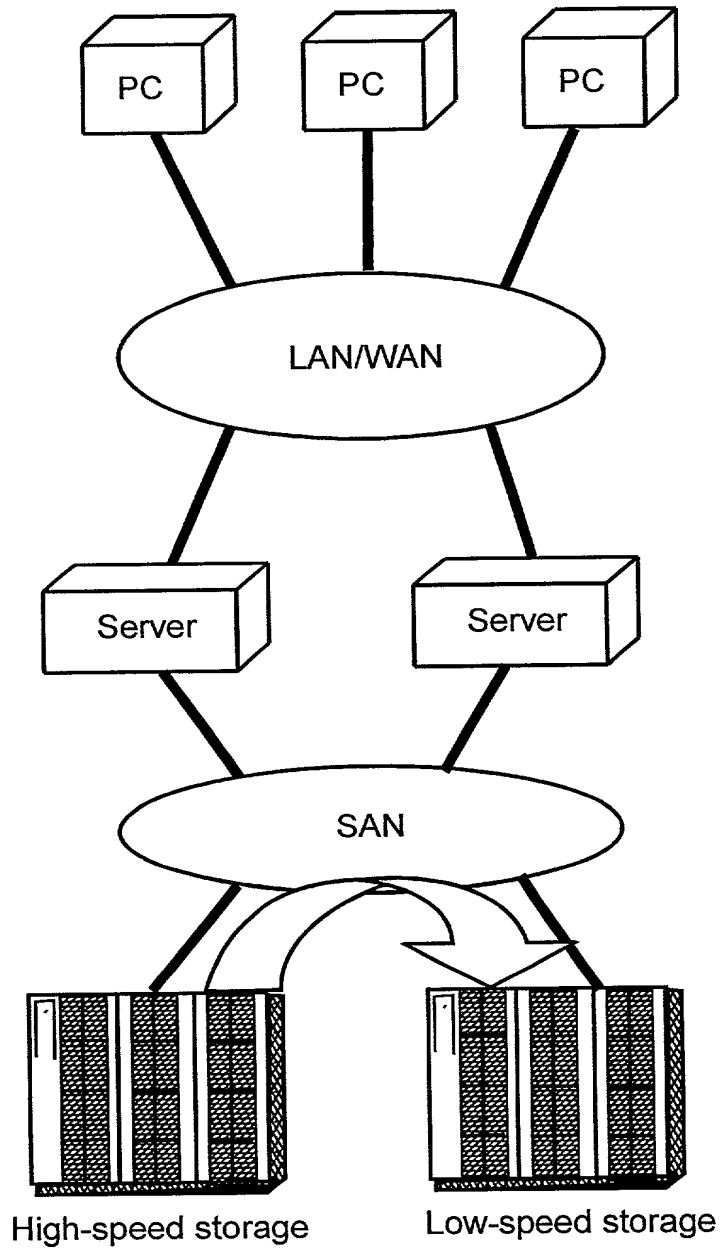Applicant: Hiroshi Koizumi, *et al.*
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Atty Docket No. 16869P-030800
Sheet 9 of 11

FIG.10

Migration to different device

High-speed storage   Low-speed storage

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Atty Docket No. 16869P-030800
Sheet 10 of 11

FIG.11

RAID
group 1

Average drive busy rate: 50.7%

	D1	D2	D3	Average	Average drive busy rate after volume migration
V0	15	10	7	10.7	40
V1	30	20	35	28.3	22.3
V2	10	10	15	16.7	39
Entire drive	55	40	57	50.7	

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Atty Docket No. 16869P-030800
Sheet 11 of 11

FIG.12

RAID group 2   Average drive busy rate: 13.3%

	D1	D2	D3	Average
V3	10	5	5	6.7
V4	5	10	10	6.7
Entire drive	15	15	10	13.3

FIG.13

RAID group 2   Average drive busy rate:13.3%→41.7%(expected)

	D1	D2	D3	Average
V3	10	5	5	6.7
V4	5	10	10	6.7
Entire drive	15	15	10	13.3
V1	30	20	35	
Entire drive (expected)	45	35	45	41.7